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Reporting from and review of Parties included in Annex I to the Convention
Compilation and synthesis of sixth national communications and first biennial reports from Parties included in Annex I to the Convention

Compilation and synthesis of sixth national communications and first biennial reports from Parties included in Annex I to the Convention

Executive summary

Note by the secretariat

Summary

This document contains a summary of the information presented in the compilation and synthesis report of the sixth national communications and first biennial reports submitted to the secretariat by Parties included in Annex I to the Convention. It provides information on a range of issues relating to the implementation of the Convention, such as: national circumstances; greenhouse gas emission trends; projections and estimates of the total effect of policies and measures; policies and measures; quantified economy-wide emission reduction targets and progress towards their achievement; the provision of financial, technological and capacity-building support to developing country Parties; vulnerability assessment, climate change impacts and adaptation measures; research and systematic observation; and education, training and public awareness.

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I. Mandate and approach

1. Article 4, paragraphs 1 and 2, and Article 12 of the Convention require Parties included in Annex I to the Convention (Annex I Parties) to communicate information periodically to the Conference of the Parties (COP). The COP, by decisions 9/CP.16 and 2/CP.17, requested Annex I Parties to submit their sixth national communications (NC6s) and first biennial reports (BR1s) by 1 January 2014. In accordance with decisions 11/CP.4, 4/CP.5 and 4/CP.8, Annex I Parties should use the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines on NCs) for the preparation of their national communications under the Convention. In accordance with decision 2/CP.17, Annex I Parties should use the "UNFCCC biennial reporting guidelines for developed country Parties" (hereinafter referred to as the UNFCCC reporting guidelines on BRs) for the preparation of their first biennial reports.

2. The COP, by decisions 22/CP.19 and 2/CP.17, requested the secretariat to prepare compilation and synthesis reports on the NC6s and BR1s, respectively. This document responds to those requests. Owing to the broad overlap between the UNFCCC reporting guidelines on NCs and those on biennial reports (BRs), and in line with decision 23/CP.19, in which it is specified that the same information submitted by an Annex I Party in its biennial report, national communication and greenhouse gas (GHG) inventory will be reviewed only once, this compilation and synthesis covers all of the information contained in both the NC6s and the BR1s of 43 Annex I Parties (42 countries[1] and the European Union (EU)) and of Kazakhstan.[2] Information on the status of the submissions is contained in document FCCC/SBI/2014/INF.19.

3. The compilation and synthesis report comprises three separate documents. The main report, which includes information on all reporting elements following the UNFCCC reporting guidelines on NCs and BRs, is published in two parts: document FCCC/SBI/2014/INF.20/Add.1 contains a synthesis of the reported information on national circumstances, GHG inventories, emission projections, quantified economy-wide emission reduction targets and progress in their achievement, policies and measures (PaMs), and the provision of financial, technological and capacity-building support to developing country Parties; and document FCCC/SBI/2014/INF.20/Add.2 contains a synthesis of the reported information relating to vulnerability assessment, climate change impacts and adaptation measures, research and systematic observation, and education, training and public awareness. The present document is an executive summary of the information contained in those two documents.

4. Each of the documents referred to in paragraph 3 above can be read as a stand-alone paper. When appropriate, cross references are made to avoid repetition. All references to Parties in the documents are to Annex I Parties, unless otherwise indicated.

[1] This includes Turkey, which submitted its fifth national communication on 17 December 2013.

[2] Kazakhstan is not included in Annex I to the Convention, but in accordance with the conclusions of COP 12 (FCCC/CP/2006/5), submitted its NC6 in accordance with Article 4, paragraph 2(b), and Article 12 of the Convention, using the UNFCCC reporting guidelines on NCs. Kazakhstan has also voluntarily undertaken additional obligations in accordance with Article 4, paragraph 2(b), of the Convention.

II. Executive summary

A. National circumstances and greenhouse gas emission trends

5. Total aggregate GHG emissions excluding emissions and removals from land use, land-use change and forestry (LULUCF) for all Annex I Parties taken together decreased from 19.1 to 17.0 thousand megatonnes of carbon dioxide equivalent (Mt CO_2 eq), a **decline of 10.6 per cent,**[1] **in the period 1990–2012** (see the table and figure 1).[2]

6. The 10.6 per cent decline in Annex I Parties' total emissions can be attributed to several factors over three distinct periods:

(a) In the period 1990–2000, there was a 6.7 per cent drop in GHG emissions, owing mainly to the **transition to a market economy occurring in Annex I Parties with economies in transition (EIT Parties)** and the resulting drop in gross domestic product (GDP) and energy use, as well as to the adoption of more efficient technologies. The decrease in EIT Parties' emissions more than offset the emission increases of those Parties that do not have economies in transition (non-EIT Parties);

(b) In the period 2000–2007, there was a 3.4 per cent increase in emissions, owing to a combination of **strong economic growth in many EIT Parties, slower economic growth in non-EIT Parties** and the effect of the implementation of mitigation PaMs in the early 2000s;

(c) In the period 2007–2012, there was a 7.3 per cent drop in emissions, owing to the **global financial and economic crisis**, which led to a **decline in energy use;** the **implementation of new and strengthened PaMs;** and **autonomous technological improvements and behavioural changes**.

Percentage changes in Annex I Parties' total aggregate anthropogenic greenhouse gas emissions and gross domestic product

	Excluding emissions/removals from LULUCF				*Including emissions/removals from LULUCF*				*GDP*[c]
Party	*1990*[b]*–2000*	*2000–2007*	*2007–2012*	*1990*[b]*–2012*	*1990*[b]*–2000*	*2000–2007*	*2007–2012*	*1990*[b]*–2012*	*1990*[b]*–2012*
All Annex I Parties	–6.7	3.4	–7.3	–10.6	–10.4	2.4	–8.7	–16.2	51.2
EIT Parties	–41.4	7.1	–1.4	–38.1	–51.3	5.3	–1.9	–49.7	25.8
Non-EIT Parties	9.1	2.4	–8.8	1.9	9.8	1.8	–10.2	0.3	55.3

Abbreviations: EIT = economies in transition, GDP = gross domestic product, LULUCF = land use, land-use change and forestry

[a] GDP (billions of 2005 USD) using purchasing power parity

[b] Calculations use 1990 data for all Parties, except for those for which the base year is defined by decisions 9/CP.2 and 11/CP.4: Bulgaria (1988), Hungary (average of 1985–1987), Poland (1988), Romania (1989) and Slovenia (1986).

7. The levels of GHG emissions per unit of GDP (emission intensity) and GHG emissions per capita have pursued their downward trend but continue to vary significantly

[1] The percentage changes given in this chapter were calculated using the exact (not rounded) values and therefore may differ from the sums or ratios calculated with rounded numbers provided in document FCCC/SBI/2014/INF.20/Add.1.

[2] While in their NC6s and BR1s Parties reported GHG inventory data for 2011, as this was the most recent year for which data were available at the time of preparation of NC6s and BR1s, this document relies on the most recent inventory data available at the time of its preparation – for year 2012.

across Annex I Parties. During the 1990–2012 period, while Annex I Parties' total emissions (excluding LULUCF) fell by 10.6 per cent, population and GDP grew by 10.4 per cent and 51.2 per cent, respectively. This resulted in **falls in emissions per capita and emission intensity of the economy in Annex I Parties over that period of 15.2 per cent and 35.5 per cent, respectively**. The extent of the decoupling of emissions from population and GDP growth was greater for EIT Parties (33.0 per cent decline in emissions per capita and 46.4 per cent decline in emission intensity), although a considerable decoupling for non-EIT Parties also occurred (8.6 per cent decline in emissions per capita and 33.7 per cent decline in emission intensity).

8. Significantly, some non-EIT Parties have **managed to reduce emissions despite strong economic growth**. Belgium, Denmark, the EU and its 15 member States,[3] Finland, France, Germany, Luxembourg, the Netherlands, Sweden and the United Kingdom of Great Britain and Northern Ireland succeeded in keeping their total GHG emissions (excluding LULUCF) in 2012 below their 1990 levels while each experiencing GDP growth of over 38 per cent. Of those non-EIT Parties, **Denmark, Germany, Sweden and United Kingdom succeeded in reducing their emissions by at least 20 per cent below their 1990 levels**. While various factors contributed to this result, considerable credit is due to their implementation of effective PaMs, which mainly promote energy efficiency, renewable energy sources (RES) and fuel switching.

9. Putting these successes into context, **Annex I Parties' share of RES in total primary energy supply (TPES) increased by 62.1 per cent over the period 1990–2012**, from 5.2 per cent to 8.4 per cent. For EIT Parties, the share of RES in TPES increased from 2.4 per cent in 1990 to 4.7 per cent in 2012, a 92.2 per cent increase over the period. For non-EIT Parties, the share of RES in TPES increased from 6.2 per cent to 9.3 per cent between 1990 and 2012, an increase of 50.8 per cent. Consequently, **between 1990 and 2012**, the **carbon intensity of energy use** (energy-related GHG emissions[4] divided by TPES) in **Annex I Parties decreased by 6.5 per cent**. In 1990, EIT Parties' energy use was 16.6 per cent more carbon-intensive than that of non-EIT Parties, while in 2012 the carbon intensity of energy use of EIT (2,508.75 kg CO_2 eq/toe) and non-EIT Parties (2,429.04 kg CO_2 eq/toe) was nearly equal.

10. Finally, while **between 1990 and 2012** TPES in Annex I Parties increased by 2.5 per cent, **TPES per unit of GDP (energy intensity of the economy) dropped by 28.0 per cent**, from 0.23 toe per thousand USD in 1990 to 0.15 toe per thousand USD in 2012. For EIT Parties, TPES per unit of GDP dropped by 34.6 per cent over the period 1990–2012 (from 0.43 to 0.26 toe per thousand USD). For non-EIT Parties, TPES per unit of GDP dropped by 27.0 per cent over the same period (from 0.18 to 0.13 toe per thousand USD).

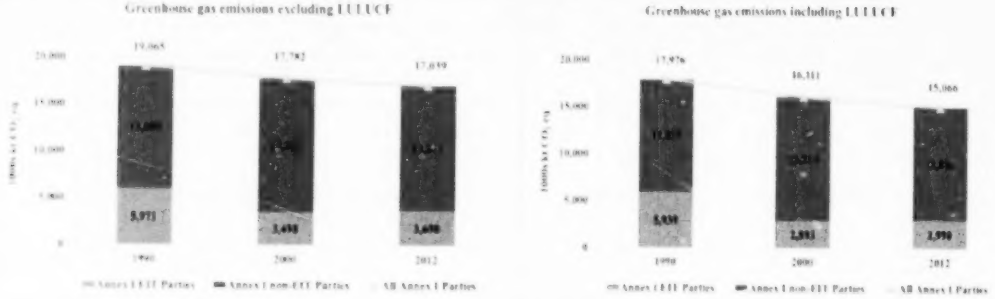
11. Annex I Parties' **emissions of each of the GHGs, except hydrofluorocarbons (HFCs), declined during the 1990–2012 period** (see figure 2). Total emissions of perfluorocarbons (PFCs) declined the most – by 79.0 per cent, followed by sulphur hexafluoride (SF_6) – by 62.2 per cent, nitrous oxide (N_2O) – by 25.3 per cent, methane (CH_4) – by 19.6 per cent and carbon dioxide (CO_2) – by 8.7 per cent. **Conversely, emissions of HFCs increased by 175.8 per cent**, owing mainly to the increase in the use of HFCs as a substitute for ozone-depleting substances controlled by the Montreal Protocol (see figure 2).

[3] The European Union and its 28 member States includes many Parties with economies in transition.

[4] Here, "energy-related GHG emissions" means emissions from the energy sector as reported in the 2014 national inventory submissions.

Figure 1

Greenhouse gas emissions of Annex I Parties, 1990, 2000 and 2012

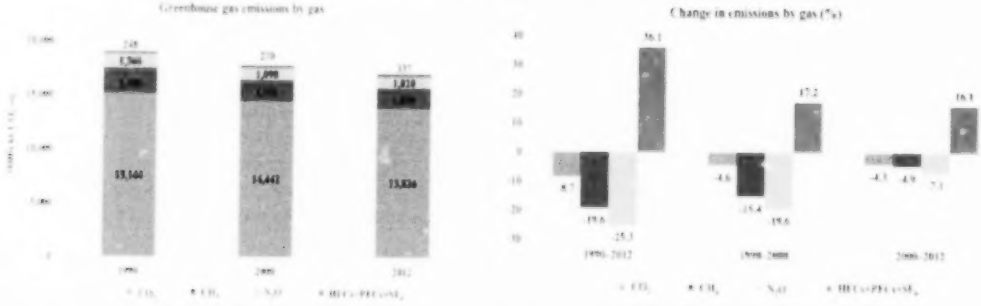


Abbreviations: EIT Parties = Parties with economies in transition, LULUCF = land use, land-use change and forestry, non-EIT Parties = Parties that do not have economies in transition.

12. As a result of the trends referred to in paragraph 11 above, the **shares of the individual GHGs in the total emissions shifted slightly in the 1990–2012** period. CO_2 continued to contribute the largest share of the total emissions, accounting for 81.1 per cent in 2012 (79.4 per cent in 1990), while CH_4 and N_2O contributed 10.9 per cent and 6.0 per cent, respectively, to the total emissions in 2012 (12.1 per cent and 7.2 per cent, respectively, in 1990). Emissions of PFCs and SF_6 taken together accounted for a share of approximately 0.7 per cent in 2012 (0.2 per cent in 1990). Emissions of HFCs accounted for approximately 1.7 per cent in 2012 (0.6 per cent in 1990).

Figure 2

Greenhouse gas emissions of Annex I Parties, by gas



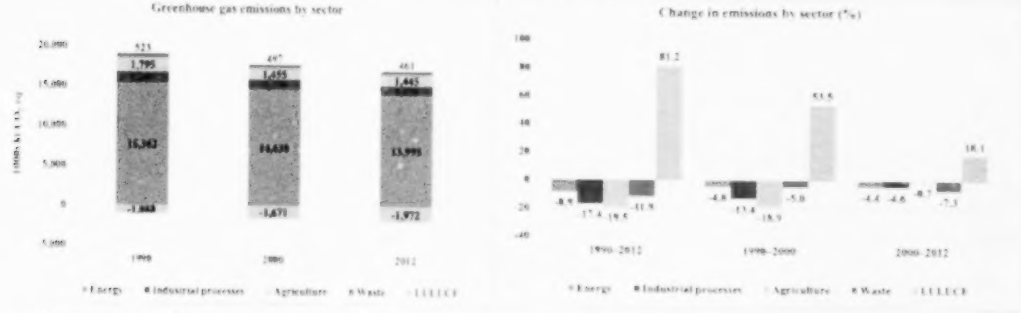
13. **Emissions from all sectors decreased between 1990 and 2012** (see figure 3). The greatest decrease occurred in agriculture (–19.5 per cent), which reflects the drop in emissions of CH_4 and N_2O. Nearly all of the decrease in emissions from agriculture occurred in the period 1990–2000 (–18.9 per cent). Emissions from industrial processes underwent the second-largest decrease in the period 1990–2012 (–17.4 per cent), followed by waste (–11.9 per cent) and energy (–8.9 per cent). **Net GHG removals from LULUCF increased by 81.2 per cent**.

14. The **decline in emissions from the energy sector during the 1990–2012 period resulted from emission reductions in all energy subsectors, except transportation**, where emissions increased by 10.4 per cent over that period. It is worth noting that emissions from transportation rose progressively until 2007, but decreased considerably

after that (see para. 6 above). As a result, **emissions from transportation in 2012 were at a slightly lower level than in 2000**. Emissions from the other energy subsectors decreased as follows: –22.5 per cent for manufacturing industries and construction; –20.8 per cent for other sectors (residential and commercial); –17.3 per cent for fugitive emissions from fuels; and –3.0 per cent for energy industries (primarily electricity and heat production). As in previous national communications, in their NC6s many Parties identified limiting growth in emissions from transportation as the main challenge in their climate change mitigation PaMs.

Figure 3

Greenhouse gas emissions and removals of Annex I Parties, by sector[a]



Abbreviation: LULUCF = land use, land-use change and forestry

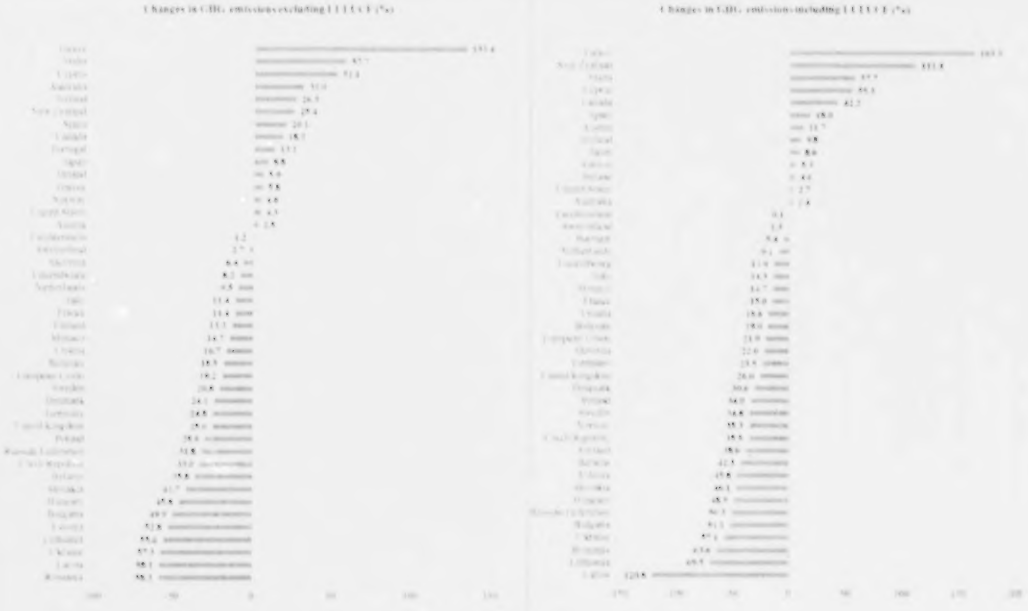
[a] The solvent and other product use sector is not included in the figure because its contribution to total greenhouse gas emissions is very small.

15. The changes in the total aggregate GHG emissions over the period 1990–2012 again varied considerably across Parties (see figure 4). Emissions excluding LULUCF increased in 9 Parties by more than 10.0 per cent and decreased in 23 Parties (including the EU and its 28 member States) by more than 10.0 per cent. Most of the latter Parties are EIT Parties; nine are non-EIT Parties, namely Germany, Monaco, Sweden and United Kingdom,[7] which have continued this level of performance since their fifth national communications (NC5s), and Belgium, Denmark, Finland, France and Italy, which have recently achieved this level of performance according to their NC6s and BR1s. If LULUCF is included, Luxembourg and Norway's levels of emissions in 2012 were lower by at least 10.0 per cent than their 1990 levels. Total aggregate GHG emissions including LULUCF over the period 1990–2012 increased in 13 Parties and decreased in 30 Parties.

[7] The EU and its 28 member States, which reduced their GHG emissions by 19.2 per cent over the period 1990–2012, are not counted as they include EIT Parties.

Figure 4

Changes in the total aggregate emissions of individual Annex I Parties, 1990–2012



Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry

B. Projections and the total effect of policies and measures[8]

16. Annex I Parties' projections for the 'with measures' scenario indicate that their total **GHG emissions are projected to decrease by 9.7 per cent by 2020** compared with the 1990 level. This result differs sharply from the projections reported in the NC5s,[9] where emissions were reported to be expected to increase (by 0.6 per cent) over the same period. Total GHG emissions in 2030 are projected to be 7.4 per cent below the 1990 level, because **between 2020 and 2030 emissions are projected to increase by 2.6 per cent if no additional measures are implemented**. Compared with in 2010, GHG emissions by 2020 are projected to have increased by 0.2 per cent, while emissions by 2030 are projected to be 2.9 per cent higher than in 2010. This is projected to be **driven by the continuous small growth in the emissions of EIT Parties** since around 2000, following economic recovery, while the emissions of non-EIT Parties are projected to remain broadly stable (see figure 5).

[8] The various projections presented in this section are not fully comparable and should be interpreted with caution. All of the 41 Parties that provided information in their NC 6s and BR1s reported projections for the 'with measures' scenario for 2020, while only 35 Parties reported similar data for 2030. Some 26 Parties provided projections for the 'with additional measures' scenario. The EU provided projections in its BR1, but the figures are not included in the totals in this document in order to avoid double counting. At the time of the preparation of this document, Turkey had submitted only its NC5, which did not contain data on GHG emission projections. See document FCCC/SBI/2014/INF.20/Add.1, chapter IV, for more information.

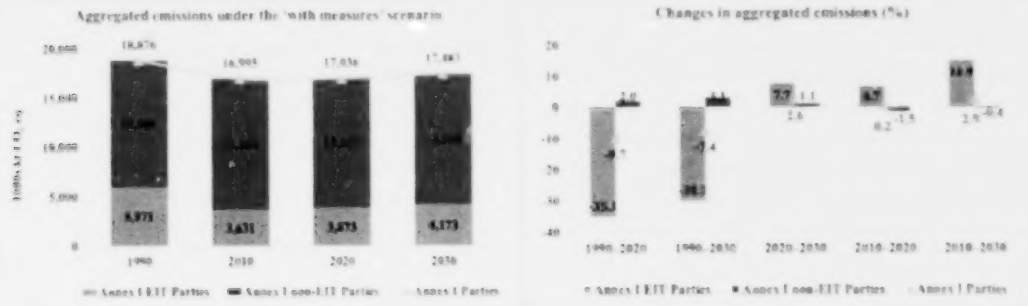
[9] See document FCCC/SBI/2011/INF.1/Add.1, chapter IV.

17. The GHG emissions of EIT Parties are projected to decrease significantly over the periods 1990–2020 and 1990–2030 (by 35.1 per cent and 30.1 per cent, respectively). However, that overall decrease masks a projected increase in the emissions of EIT Parties by 6.7 per cent by 2020 and by 14.9 per cent by 2030 compared with the 2010 level. The total GHG emissions of EIT Parties initially dropped sharply in the period 1990–2000 (see paras. 6–8 above), which was followed by a growth in emissions during the period 2000–2012 owing to the strong economic growth in many EIT Parties, a trend that is projected to persist until 2030, although at a lower rate.

18. For non-EIT Parties, modest growth in emissions is projected for both periods 1990–2020 (by 2.0 per cent) and 1990–2030 (by 3.1 per cent). Compared with in 2020, emissions by 2030 are projected to have increased slightly, by 1.1 per cent. On the other hand, emissions by both 2020 and 2030 are projected to have decreased slightly compared with in 2010 (by 1.5 per cent and 0.4 per cent, respectively), which to some extent can be attributed to the effect of PaMs.

Figure 5

Projected greenhouse gas emissions excluding land use, land-use change and forestry in 2020 and 2030 under the 'with measures' scenario



Abbreviations: EIT Parties = Parties with economies in transition, non-EIT Parties = Parties that do not have economies in transition

19. Regarding Annex I Parties' sectoral projections for 2020, the **energy sector (including transport) is projected to continue being the dominant source** (accounting for 83.3 per cent of the total) of GHG emissions in 2020. Emissions from the energy sector (excluding transport) are projected to decrease by 10.0 per cent, from 11.3 thousand Mt CO_2 eq in 1990 to 10.2 thousand Mt CO_2 eq in 2020. GHG emissions from transportation are also projected to decrease, by 9.6 per cent, from 3.0 thousand Mt CO_2 eq in 1990 to 2.7 thousand Mt CO_2 eq in 2020. Such trends are in contrast to the projections provided in the NC5s, in which emissions from the energy sector were projected to increase by 0.4 per cent by 2020. Over the period **2010–2020, according to the NC6s and BR1s, emissions from energy (excluding transport) are projected to grow by 3.1 per cent, while emissions from transportation are projected to decline by 19.6 per cent**.

20. **Emissions from all non-energy sectors are projected to decrease** over the periods 1990–2020 and 2010–2020, in general relatively more than emissions from the energy sector. Net **removals from the LULUCF sector are projected to increase by 27.4 per cent** between 1990 and 2020, but decrease by 31.8 per cent from 2010 to 2020.

21. In the longer term, for the 35 Parties that reported sectoral projections for 2030, it is expected that the energy sector will remain the dominant source of GHG emissions. Consistent with the projected changes for the period 1990–2020, emissions from 1990 to

2050 from all sectors are projected to decrease, although at a slower pace than in the period from 1990 to 2020. The waste sector is the exception to that projected trend. Net removals from the LULUCF sector are projected to continue increasing in the period 1990–2030.

22. The **projected total effect of PaMs reported as implemented and adopted in the NC 6s and BR1s is 3.1 thousand Mt CO_2 eq avoided annual emissions by 2020**. Almost half of those emission savings (44.5 per cent) are projected to occur in the energy sector. **Transport-related PaMs are expected to deliver annual savings of 0.6 thousand Mt CO_2 eq (or 19.4 per cent of the total savings)**, while the total effect of PaMs in the industrial processes sector is expected to account for 16.6 per cent of the total expected emission savings. PaMs in the remaining sectors are expected to result in about 20 per cent of the total emission savings.

C. Quantified economy-wide emission reduction targets and progress in their achievement

23. All Annex I Parties, except Turkey, have pledged targets as agreed in the Copenhagen Accord, which are contained in document FCCC/SBSTA/2014/INF.6. All of those **Parties submitted relevant information relating to their targets and progress in their achievement** in their BR1s. The information relating to the targets included assumptions and conditions, base year, coverage of gases and sectors and the role of LULUCF and carbon credits from market-based mechanisms.

24. Regarding the progress made towards achieving their targets, in their BR1s all Parties reported information on their mitigation PaMs implemented to achieve their targets. To **achieve their 2020 targets, Parties have strengthened their mitigation PaMs**, building on the policy infrastructure set up so far for the implementation of the Convention and its Kyoto Protocol. The effects of those mitigation PaMs are reflected in the emission trends: total GHG emissions (without LULUCF) in 2011[10] were below the base year emission level for most Parties and for some Parties also below the calculated target year emission level. However, as emission reductions can be the result of technological improvements, behavioural changes and economic and demographic shifts – some induced by PaMs, others not – it is **difficult to separate the effects of PaMs from the effects of other key drivers**.

25. A number of **Parties reported on their plans to use units from market-based mechanisms and LULUCF to achieve their targets** and some Parties reported a preliminary assessment of how LULUCF can contribute to their progress towards achieving their targets. However, that information is very preliminary and in some cases incomplete. Hence, it is not possible at this point in time to outline any general trends in terms of the contribution of LULUCF and the use of market-based mechanisms to the achievement of Parties' targets.

26. By 2020, the emission reductions resulting from the implemented, adopted and planned mitigation actions of all Annex I Parties are projected to equal 3.1 thousand Mt CO_2 eq. Thus, **emission reductions due to mitigation PaMs are expected by most Parties to contribute significantly to their expected emission reductions by 2020**.

27. When comparing the reported information on the 'with measures' and 'with additional measures' projections and the provisional calculated target year emissions, it appears that many **Parties expect that they can achieve their 2020 targets with**

[10] Parties reported GHG inventory data for 2011 in their NC6s and BR1s, as this was the most recent year for which data were available at the time of preparation of NC 6s and BR1s.

currently implemented and adopted PaMs alone, namely the EU and its member States, while some Parties need to put additional PaMs in place to achieve their targets.

D. Policies and measures

28. Since 1 January 2010, when the NC5s were due, **Parties have added some important PaMs** to their portfolios for climate change mitigation, but **mostly they have worked at strengthening and refining their existing PaMs** – implementing more stringent features, achieving wider coverage and increasing resource expenditure. Overall, most Parties have kept to the general strategies and portfolios of PaMs reported as implemented or adopted in their NC5s. Notable exceptions are Australia, which has instituted major reforms to its climate change strategy and policies,[11] and the United States of America, which has begun regulating CO_2 emissions from power plants because its plans to establish a national emissions trading scheme (ETS) did not materialize. Therefore, the general mix of PaMs – economic and fiscal instruments, regulations, voluntary/negotiated agreements, framework targets, information, education and awareness programmes, research and development (R&D), and other instruments – reported in the NC6s and BR1s is very similar to that reported in the NC5s.

29. The information reported in the NC6s and BR1s suggests that most Parties continue to view **climate change as a prominent policy concern**, with all Parties having national climate change strategies, action plans and programmes with mitigation PaMs. Some **1,448 implemented, adopted and planned mitigation PaMs**, with highly diverse scopes and expected emission impacts, were reported. The PaMs are used at all levels of governmental jurisdiction – regional, national, state/provincial and municipal – to influence the investments, purchases and behaviours of numerous individuals and institutions involved in a myriad of activities related to energy supply, energy end-use and non-energy emissions.

30. **PaMs, along with some autonomous technological improvements, behavioural changes and economic and demographic shifts, are reducing or at least limiting growth in GHG emissions in most Annex I Parties** (see paras. 8 and 15 above). The multitude of reported climate change PaMs is diverse and complex, but the **following emerging trends are apparent**:

(a) In response to the urgent need to reduce GHG emissions, **Annex I Parties agreed to implement economy-wide emission reduction targets for 2020** and submitted relevant information on their targets in 2010 (see para. 23 above). In addition, Annex I Parties to the Convention that are also Parties to the Kyoto Protocol agreed on legally binding emission reduction targets for the second commitment period, which spans between 2013 and 2020;

(b) The requirement to meet their 2020 targets shaped Annex I Parties' further policy responses. They have **mostly strengthened and refined the details of their existing PaMs** (e.g. the phase 3 reforms of the European Union Emissions Trading System and more stringent vehicle standards in Canada and United States) – to further reduce emissions, cut costs, diminish the administrative burden, etc. – as lessons are learned and market and technological conditions evolve. They have also **implemented some major new PaMs**: some reported as planned in the NC5s (e.g. United States regulations on emissions from power plants and the EU effort-sharing decision); and some newly reported in the NC6s and BR1s (e.g. the EU energy efficiency directive);

[11] The centrepiece of Australia's reforms, the Carbon Pricing Mechanism emissions trading scheme, was repealed in July 2014, after the submission of its NC6.

(c) Many Parties now have their **broad, foundational PaMs in place** (e.g. carbon pricing systems, vehicle and power plant regulations, framework targets and market reforms) and are **increasingly using more flexible policy instruments**, such as project funding, to realize the mitigation potential in niche or site-specific situations.. This is especially noticeable for Annex I Parties that are also Parties to the Kyoto Protocol because of their binding emission reduction targets for the first (2008–2012) and second (2013–2020) commitment periods of the Kyoto Protocol. Framework targets (or burden-sharing commitments), in the context of multilevel governance, are used to **devolve partial responsibilities for mitigation to other levels of government** (e.g. EU member States and states/provinces). These PaMs are increasingly specific – and often legally binding – in their mandates. The mitigation projects, **sometimes funded by Parties from recycled revenues from ETS auctions and carbon taxes or other sources**, are often administered by local authorities, which are closer to the niche opportunities and able to scale up action on the ground;

(d) **One of the major successes of PaMs is manifested in the rapid growth in renewable energy production and use in recent years** (during the 2004–2012 period, the non-hydropower renewable energy share of total electricity consumption grew from 2.5 per cent to 11.2 per cent in the EU and from 2.1 per cent to 5.4 per cent in the United States). This was attributed to a large extent to PaMs-based production targets, feed-in tariffs and price incentives. This growth has contributed greatly to limiting or reducing emissions and many Parties are working towards still higher renewable energy targets in the 2020 time frame. However, as **renewable energy technologies have matured and their costs have fallen considerably**, some Parties are reassessing the current levels of incentives and subsidies in meeting the higher targets;

(e) Parties continue to promote mitigation through PaMs traditionally associated with **energy goals** (e.g. vehicle fuel economy and energy security), but are increasingly drawing attention to the **emission reduction aspects** of those PaMs. For example, standards for vehicles in Canada, EU and United States are now defined in terms of both fuel economy and GHG emissions. Also, building labelling programmes in the EU include a measure of GHG emissions as well as energy use;

(f) Parties, in the context of job creation and economic competitiveness, are increasingly engaging with and supporting the **interests of their business and commercial enterprises** through PaMs focused on **low-carbon technology innovation and investment**;

(g) In the light of the Fukushima Daiichi nuclear power plant accident, some Parties have decided to **re-examine the political viability of** (and, in some cases, phase out) **their use of nuclear power and consider its impact on climate policy and targets**;

(h) Some Parties have begun seeking – through ETSs and associated offset programmes – increased emission reductions in the oil, natural gas and coal sector (e.g. **fugitive emissions**) (EU) and in the **agriculture and forestry sectors** (Australia). This is in addition to the traditional coverage of such schemes and programmes of fuel combustion and energy-use installations.

31. Several Parties provided information in their BR1s on the **assessment of the economic and social consequences of response measures**. Some Parties reported ways in which they minimize the adverse effects of the implementation of their PaMs, which is related to, but distinct from, the assessment of the economic and social consequences of PaMs. Some Parties made reference to the reporting, in their NC6s, on ways to minimize

the adverse effects of the implementation of PaMs under Article 2, paragraph 3, of the Kyoto Protocol.[12]

E. Financial resources, technology transfer and capacity-building

32. In accordance with the respective reporting guidelines, Parties included in Annex II to the Convention (Annex II Parties) provided in their NC6s and BR1s **quantitative as well as qualitative information on the provision of financial resources, technology transfer and capacity-building support** to developing countries. The information provided refers to **adaptation and mitigation activities** that were supported by them, including support directed towards clean energy, energy efficiency, forestry, sustainable landscapes, land use, transport, capacity-building and REDD-plus,[13] making use of multilateral and bilateral channels. Many Annex II Parties reported activities undertaken in the context of the fast-start finance period, which spanned from 2010 to 2012,[14] indicating that the collective commitment had been met.[15]

33. The **identification of clear trends** and patterns in the provision of financial resources as compared with the data provided in the NC5s **is very difficult owing to the numerous reporting issues**.[16] However, the information provided in the NC6s and BR1s suggests that Annex II Parties continue to make prominent use of multilateral and bilateral channels in the provision of financial resources for the implementation of the Convention, with a significant **increase in funds provided through bilateral channels in comparison with in the previous reporting period**.

34. There have been increases in the reported funding directed towards **adaptation** and, with regard to sectoral distribution, in the funding directed towards **energy, forestry, including REDD-plus, capacity-building and cross-cutting activities**, as well as in the financing provided to funds other than Convention funds that are relevant to climate mitigation and adaptation. In general, the information contained in the BR1s suggests that the predominant funding source is official development assistance. Furthermore, this information suggests that Annex II Parties mainly used grants as a financial instrument, with concessional loans, equity and non-concessional loans being the minority instruments utilized. The greater part of the funding reported on was marked as "provided" and as climate-specific contributions.

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[12] See document FCCC/SBI/2014/INF.21, paragraphs 23 and 221, for further information reported in NC6s.

[13] Policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

[14] At COP 15, developed countries pledged to provide new and additional resources, including for forestry and investments, approaching USD 30 billion for the period 2010–2012 and with a balanced allocation between mitigation and adaptation. That collective commitment has come to be known as fast-start finance. Following up on that pledge, COP 16 took note of the collective commitment and reaffirmed that funding for adaptation would be prioritized for the most vulnerable developing countries, such as the least developed countries, small island developing States and African countries. Furthermore, the COP invited developed country Parties to submit information on the resources provided by them to achieve the goal, including ways in which developing country Parties could access the resources, by May 2011, 2012 and 2013.

[15] More information, including all information provided by developed country Parties, is available at <http://unfccc.int/5646.php>.

[16] See document FCCC/SBI/2014/INF.20/Add.1, p. 95.

35. **Annex II Parties reported a continued provision of funding to the Global Environment Facility (GEF)**, although the sum of the amounts reported by Annex II Parties in their NC6s is lower than that reported in the NC5s. However, the sum of Annex II Parties' contributions to the **Least Developed Countries Fund** and the **Special Climate Change Fund** reported in their NC6s is higher than the sum of the reported amounts in their NC5s. In addition, Annex II Parties' reporting indicates a **continued provision of funds to the Adaptation Fund**, and they have started to report on funds provided to the **Green Climate Fund**.

36. Annex II Parties reported financial contributions to **multilateral institutions**, the sum of which is slightly lower than the sum reported in the NC5s. The sum of the reported amounts of support provided to multilateral development banks, such as the African Development Bank and the Inter-American Development Bank, however, is higher, in some cases significantly, than the sum of the contributions reported in the NC5s.

37. A few Annex II Parties provided specific information on their financial contributions to Climate Investment Funds, such as the Clean Technology Fund. The preference, identified in the NC5s, for channelling financial resources through funds that are not necessarily under the Convention has continued to manifest itself.

38. Several Annex II Parties provided information on the **regional distribution of their support and their prioritized allocation to the most vulnerable developing countries**, such as the least developed countries, small island developing States and African countries.

39. **All Annex II Parties provided information on practicable steps taken to promote, facilitate and finance the transfer of, or access to, environmentally sound technologies** and know-how to other Parties, particularly developing country Parties, thus giving effect to their commitments under Article 4, paragraph 5, of the Convention. Almost all of the Annex II Parties included a separate section on the transfer of technology in their NC6s and BR1s and many provided examples of concrete technology transfer projects and programmes.

40. Many Annex II Parties reported **engaging bilaterally with developed and developing countries in climate technology transfer activities**. Such activities were undertaken during various stages of the technology cycle, including the research, development, demonstration, deployment, diffusion and transfer of technology stages. Similar to in the NC5s, the activities in developing countries reported in the NC6s generally focused on the latter stages of the technology cycle, often as efforts to foster enabling environments to enhance technology transfer. The **majority of the activities were related to the mitigation** of GHG emissions in the energy sector, particularly in relation to renewable energy and energy efficiency technologies. However, since the NC5s, **more reported technology activities have focused on supporting climate change adaptation**. By region, Annex II Parties reported implementing a larger percentage of projects in the Latin America and Caribbean region and on a global scale since the NC5s.

41. Many Annex II Parties highlighted **factors that contributed to the successful implementation of their climate technology transfer activities**, including: aligning the activities with the national policies and priorities, plans and strategies of the recipient Party; undertaking a holistic and integrated approach to technology transfer (which includes capacity-building and awareness components); undertaking a market analysis; utilizing innovative financing; and developing strong and capable institutions, networks and expert capacity. Another success factor reported by many Annex II Parties was the development of **partnerships with and between relevant stakeholders**. Partnerships were reported to be an effective channel through which to implement technology activities and facilitate local ownership thereof.

42. The information on **capacity-building reported by Annex II Parties in their NC6s and BR1s covers all of the 15 needs and priority areas**[17] identified in the framework for capacity-building in developing countries established under decision 2/CP.7. Some Annex II Parties, while indicating their **difficulty in reporting on capacity-building** as a stand-alone activity, underlined the importance of **integrating capacity-building into projects and/or programmes**, thus ensuring that the capacity being built is relevant, effective and tied to results. In several instances, capacity-building support cuts across different climate change related areas, such as **poverty reduction, food security, health, research and systematic observation, and meteorology**. Several Annex II Parties reported on capacity-building support provided to countries with economies in transition according to the priority areas[18] identified in the framework for capacity-building in countries with economies in transition established under decision 3/CP.7.

43. Many Annex II Parties reported having intensified the provision of **capacity-building support through their participation in multi-stakeholder cooperation projects** and in interregional network initiatives at the national, regional and subregional levels. The wide spectrum of stakeholders mentioned by Annex II Parties includes actors from the public sector, the private sector and civil society. In particular, the NC6s and BR1s show an increase in examples of **public–private partnerships**. In that context, Annex II Parties have invested capacity-building efforts to enable developing countries to **attract private investments** to fund projects and activities with mutual environmental goals.

F. Vulnerability assessment, climate change impacts and adaptation measures

44. Annex I Parties provided information on vulnerability assessment, observed and expected impacts of climate change, national adaptation policies and legislative frameworks, and adaptation measures undertaken as well as planned. The NC6s, in comparison to the NC5s, contain more substantial information on national adaptation strategies, action plans and programmes and adaptation measures. They suggest that **adaptation efforts have been scaled up and enhanced**, as reflected in: the number of national adaptation strategies and plans and/or programmes that have been developed; the strengthening of the knowledge base; and the pronounced trend towards the increased implementation of adaptation measures at the local level.

45. Parties reported on **a range of sectors and areas that are most vulnerable to climate change** depending on their national circumstances, such as water resources, agriculture and food security, forestry, biodiversity and natural ecosystems, coastal zones, fisheries, human health, infrastructure and tourism, as well as emerging vulnerable areas relating to the urban, energy and business/trade sectors. The **climate change impacts** of most concern reported by Parties that are already observed or expected include increased extreme weather events, heat and water stress, and rising sea levels and temperatures.

46. Parties reported on **adaptation measures undertaken as well as planned across a wide range of sectors and areas**, including freshwater resources, agriculture, food security, biodiversity, fisheries, human health, forestry, infrastructure, urban areas and economic and trade systems. Parties increasingly mentioned **measures relating to cross-sectoral challenges and those with adaptation-mitigation co-benefits**. This trend is particularly visible in relation, but not limited, to the agriculture sector.

[17] Decision 2/CP.7, annex, paragraph 15.
[18] Decision 3/CP.7, annex, paragraph 20.

47. **Many Parties are increasingly seeing climate change adaptation as part of their sustainable development efforts and are increasingly mainstreaming their adaptation efforts.** Some Parties reported new multilateral and bilateral development cooperation initiatives to support the adaptation efforts of developing country Parties.

G. Research and systematic observation

48. Reported activities in the area of research and systematic observation show the **continuation of many long-term programmes as well as the development of new initiatives to address emerging needs for climate-related scientific knowledge and information**. Research activities to support policy processes and the assessment of national mitigation and adaptation strategies continue to be a high priority for almost all Annex I Parties.

49. Parties reported **greater coordination of climate-related research activities and enhanced collaboration across sectors**, in some cases also noting challenges in coordinating research and technology development, due to the cross-cutting nature of climate change, and the need for new multidisciplinary approaches to solve such challenges over the next decades. In addition, **active participation in international initiatives through regional and global research programmes and organizations** active in climate change research, and contributing to the assessments of the Intergovernmental Panel on Climate Change, continue to be important activities for many Parties. Climate system studies and modelling provide an example of where international cooperation and investments resulted in advances in the scope of the processes represented in global climate models, including: biogeochemistry; cloud and aerosol processes; and the inclusion of ice sheet model components.

50. While funds allocated to climate change research often reflect national strategic priorities, investments in **research are also being directed towards addressing gaps in scientific knowledge and reducing uncertainties**. Increased contributions from the private sector were reported, especially for research on mitigation, such as in relation to the energy sector and the transition to a low-carbon economy, and on climate change impacts and adaptation.

51. Research in support of a universal climate change agreement by 2015 was highlighted by a few Parties, and some Parties have established national knowledge centres to help reformulate research findings in support of related decision-making. A few Parties reported on research on the carbon cycle and climate stabilization, the peaking of emissions, and technological, economic and behavioural aspects relevant to the transition to a low-carbon economy in the context of limiting the temperature increase to 2 °C above pre-industrial levels. **Climate science assessments and advances in information management and data sharing**, including the promotion of free and open access to data, were highlighted as important mechanisms for informing decision makers and society.

52. Several Parties reported on **enhanced observations of the climate system**. Examples include new capacity, technology and sites for monitoring the atmosphere, oceans, cryosphere and biosphere systems and their interrelations. Advances made include the improvement of observation capabilities allowing better representation of snow and ice in global climate models and the availability of regional-scale and space-based observations of GHGs. Most Parties reported on their contributions to the Global Climate Observing System and other global observing systems in the oceanic and terrestrial domains, as well as on ongoing activities in relation to providing climate services.

53. **Support provided to capacity-building for research and systematic observation in developing countries** was highlighted by many Parties, including cooperation activities

implemented through bilateral and international programmes and projects and regional cooperation. Such activities help in enhancing the availability of data and knowledge on climate change, including on adaptation and mitigation options, strengthening systematic observation networks and capabilities and creating multidisciplinary research environments.

II. Education, training and public awareness

54. In their NC6s, most Parties highlighted **climate change education as an essential component of climate action** and reported an increasing number and range of activities in formal, non-formal and informal climate change education. Climate change is now **part of the official curricula at the preschool, primary, secondary and university levels** in most countries. While many Parties reported that climate change education is addressed as part of environmental education, some Parties have included it as a stand-alone subject or across disciplines and increased its prominence in recent revisions to the curricula. Some Parties reported on the introduction of new university programmes and adult education courses with a specific focus on climate change.

55. **Training for the public and private sectors** has been conducted by many Parties in collaboration with non-governmental organizations (NGOs) and private-sector entities, with a focus on **fostering the implementation of energy saving and energy efficiency measures**, low-carbon urban planning, transportation and construction practices, fuel-efficient driving, low-carbon procurement policies and ecotourism. Some Parties reported on advancements in **technical and vocational education and training** towards creating green skills and green jobs in the areas of renewable energy, energy efficiency, energy auditing and the development and deployment of environmentally friendly technologies.

56. All Parties reported having carried out **awareness-raising activities on climate change** related issues. Many Parties reported on activities that went beyond the objective of simply informing about the causes and adverse effects of climate change to encouraging the public to take concrete climate actions. The focus of many **awareness-raising activities** was the provision of information on direct and indirect GHG emissions from the production and use of goods and services and from lifestyle choices in order to give consumers and the private sector a basis for well-informed decision-making while encouraging behavioural changes towards low-emission production and consumption patterns. An **increasing focus on raising awareness of adaptation** issues, in particular with regard to extreme weather events, was reported by some Parties.

III. Conclusions

57. Annex I Parties' total **GHG emissions** excluding LULUCF **decreased by 10.6 per cent during the 1990–2012** period, owing largely to: EIT Parties' transition to market economies and the resulting drop in GDP and energy use; the adoption of more efficient technologies during the period 1990–2000; the global economic crisis, starting in 2008, which also resulted in a decline in energy use; the implementation of new and strengthened PaMs; and autonomous technological improvements and behavioural changes.

58. **During 1990–2012, emissions per capita and emission intensity of the economy in Annex I Parties declined by 15.2 per cent and 35.5 per cent, respectively**. Concurrently, while **between 1990 and 2012** TPES in Annex I Parties increased by 2.5 per cent, **TPES per unit of GDP (energy intensity of the economy) dropped by 28.0 per cent.** These positive changes were also accompanied by increases in the **share of RES in TPES** in both EIT and non-EIT Parties, leading to an overall increase in that share for

Annex I Parties of 62.2 per cent over the period 1990–2012. Together, these contributed to a **6.5 per cent drop in the carbon intensity of Annex I Parties' energy use** over that period. By 2012, the carbon intensity of the energy use of EIT and non-EIT Parties had become essentially equal. All these indicators point to a certain level of decarbonization of Annex I economies, which is in part attributable to the effects of PaMs.

59. Annex I Parties agreed to **implement economy-wide emission reduction targets for 2020** and submitted relevant information on their targets in their BR1s, including assumptions and conditions, base year, coverage of gases and sectors and the role of LULUCF and carbon credits from market-based mechanisms.

60. The 2020 targets have further shaped the climate policy responses of Annex I Parties, and emerging trends in PaMs include the strengthening and refinement of the existing PaMs to further reduce emissions, cut costs, diminish administrative burden, etc., as lessons are learned and market and technological conditions evolve. Parties have also implemented some major new PaMs (e.g. **regulations on emissions from power plants, EU effort-sharing decision and EU energy efficiency directive)**. Many Parties now have their broad, foundational PaMs in place (e.g. carbon pricing systems, vehicle and power plant regulations, framework targets and market reforms) and are increasingly using more flexible policy instruments, such as project funding, to realize the mitigation potential in niche or site-specific situations..

61. One of the major **successes of PaMs is manifested in the rapid growth in renewable energy production and use** in recent years and the considerable drop in costs, in part because of PaMs-based production targets and price incentives. Many Parties are working towards still higher renewable energy targets in the 2020 time frame as a contribution towards their 2020 emission reduction targets. Parties are increasingly calling attention to the emission reduction aspects of energy-related PaMs, in particular for those aimed at **energy efficiency improvements**. In the light of the Fukushima Daiichi nuclear power plant accident, some Parties are re-examining the political viability of (and, in some cases, phasing out) their use of **nuclear power** and considering the implications for their climate policy and targets. In the context of **job creation and economic competitiveness**, Parties are increasingly supporting the interests of their business and commercial enterprises through PaMs focused on low-carbon technology innovation and investment.

62. Overall, the PaM portfolios of Annex I Parties suggest an increased use of broad **carbon pricing** frameworks, based on **ETSs**, and **stronger mandatory regulations**. This is especially noticeable for Annex I Parties that are also Parties to the Kyoto Protocol, because of their binding emission reduction targets for the first (2008–2012) and second (2013–2020) commitment periods. A number of Parties are now implementing **second- and third-generation policy strategies and PaMs**, which reflect lessons learned and are likely to be more effective in reducing emissions than previous efforts. Many Parties have established or are planning multisector (cross-cutting) ETSs as a foundation element upon which to base their climate change mitigation strategies. Many Parties are **supplanting voluntary programmes with mandatory regulations**, including mandatory ETSs, in the key emitting sectors of electricity generation, emission-intensive industry, transportation, energy supply and road vehicle transportation. Several Parties are developing long-term strategies (e.g. to 2050), with corresponding R&D programmes, for decoupling GHG emissions and economic growth and establishing low-carbon societies.

63. With the implemented and adopted PaMs, total aggregate **GHG emissions excluding LULUCF for 41 Annex I Parties are projected to decrease by 9.7 per cent during the period 1990–2020**. Total GHG emissions in 2030 are projected to be 7.4 per cent below the 1990 level, because between 2020 and 2030 emissions are projected to increase by 2.6 per cent if no additional PaMs are implemented.

64. The **projected total effect of implemented and adopted PaMs suggests annual avoided emissions of about 3.1 thousand Mt CO2 eq by 2020** (about 16 per cent of the GHG emissions in 1990). Emissions from transportation are among the most difficult to reduce, and their growth has been identified by Parties **as the main challenge** in their climate change mitigation PaMs. Importantly, emissions from transportation declined after 2007. This trend is projected to continue and lead **to a drop in emissions of 19.6 per cent over the period 2010–2020**.

65. Parties provided information on the observed and expected **impacts of climate change**, ways to assess their **vulnerability**, and possible **adaptation measures**, strategies and options. As a continuation of the trend already observed from the NC5s, **adaptation and mitigation are increasingly viewed as complementary tracks** in the development of climate policy. The key sectors of concern in terms of climate impacts include: water resources; coastal zones; agriculture and food security; human health; forestry; biodiversity and natural ecosystems; and infrastructure and economy.

66. The NC6s suggest that **adaptation efforts have been scaled up and enhanced**, as reflected in: the number of national adaptation strategies and plans and/or programmes that have been developed; the strengthening of the knowledge base; and the pronounced trend towards the increased implementation of adaptation measures at the local level. Many Parties are increasingly seeing **climate change adaptation as part of their sustainable development efforts** and are increasingly mainstreaming their adaptation efforts.

67. Financial resources and contributions provided to developing countries reported by Annex II Parties in their NC6s, except those provided through the **GEF and multilateral institutions**, were greater than those reported in the NC5s. In particular, the sum of the **amounts reported as provided through bilateral channels was higher** for both mitigation and adaption actions. The **rise in contributions towards mitigation actions** was greater in absolute terms; while the **rise in contributions towards adaptation actions** was nearly double in percentage terms. Funding for forestry, including REDD-plus, capacity-building and cross-cutting activities also rose. A number of activities in the fields of transfer of technology, capacity-building, research and systematic observation, and education, training and public awareness were highlighted again in the NC6s as in the NC5s, including a number of international, bilateral and multinational activities and partnerships to foster the development and deployment of climate-friendly technology and the exchange of knowledge, information and data.

68. Many Annex II Parties reported **engaging bilaterally with developed and developing countries in climate technology transfer activities** from the beginning to the end of the technology cycle. Activities were undertaken in the **research, development, demonstration, deployment, diffusion and transfer of technology stages**. Activities in developing countries continue to target mainly the latter stages of the technology cycle, in order to **foster enabling environments** to enhance technology transfer, mostly in relation to renewable energy and energy efficiency technologies to mitigate GHG emissions in the energy sector. However, the NC6s and BR1s pointed to **increased technology transfer activities to support climate change adaptation** compared with those reported in the NC5s, with a larger share of reported projects implemented in the Latin America and Caribbean region and on a global scale.

69. Factors reported to contribute to the **successful implementation** of climate technology transfer activities include: **aligning the activities with the recipient country's national strategies**, policies and plans; adopting an approach to technology transfer that includes capacity-building and awareness components; undertaking a market analysis; utilizing innovative financing; and developing a strong and capable network. Lastly, Annex II Parties reported that **partnerships with and between relevant stakeholders** constituted

an effective channel for implementing technology activities and facilitated local ownership thereof.

70. **Capacity-building** activities reported by Annex II Parties **cover all of the 15 needs and priority areas** identified in the framework for capacity-building in developing countries. Annex II Parties reported having **intensified their activities** in a wide spectrum of **multi-stakeholder cooperation** projects and in interregional network initiatives at the national, regional and subregional levels, involving actors from the public and private sectors and civil society. Some Annex II Parties reported an **increased number of examples of public–private partnerships**, in line with their efforts invested in building capacity to enable developing countries to **attract private investments** to fund projects and activities with mutual environmental goals. They also highlighted the **importance of integrating capacity-building into projects and/or programmes** to help to ensure relevant, effective and results-based capacity-building support.

71. Parties have continued to strengthen their engagement in international and regional climate change **research and observation activities**, such as by participating in, and contributing and providing support to, **regional and international research programmes** and organizations that are active in climate change research and **global observing systems** and networks. Furthermore, many such **international cooperative efforts**, as well as other bilateral, multilateral or regional activities, provide support for **building and strengthening capacity** and facilitating the engagement of developing countries in such international research and observational activities.

72. Most Annex I Parties reported that **climate change education**, which is now **part of the official curricula** from the preschool to the university level, is an **essential component of climate action**. The number and range of activities in formal, non-formal and informal climate change education has continued to increase, and **training has been conducted by Parties in the public and private sectors in collaboration with NGOs and private-sector** entities to foster the implementation of measures addressing climate change. Some Parties reported on **technical and vocational education and training** towards creating green skills and green jobs in the areas of energy technology and use. All Parties reported having carried out **awareness-raising activities** on climate change related issues, focusing on information on direct and indirect GHG emissions from the production and use of goods and services and from lifestyle choices. An increasing focus on raising **awareness of adaptation issues**, in particular with regard to extreme weather events, was reported by some Parties.